

1997 Chevrolet S10 Pickup

A/C COMPRESSOR CLUTCH CONTROLS 1997 A/C GENERAL SERVICING General Motors Corp. - A/C Compressor Clutch Controls

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DESCRIPTION & OPERATION

WARNING: To avoid injury from accidental air bag deployment, read and follow all **SERVICE PRECAUTIONS** and **DISABLING & ACTIVATING AIR BAG SYSTEM** procedures in **AIR BAG RESTRAINT SYSTEM** article in the **ACCESSORIES/SAFETY EQUIPMENT** section.

NOTE: Powertrain Control Module (PCM) may also be known as Vehicle Control Module (VCM).

The A/C compressor clutch relay is controlled by the PCM. The PCM improves idle quality by delaying A/C compressor clutch engagement until idle speed is increased, or disengages A/C compressor clutch when idle speed is too low. A/C compressor clutch is cycled by PCM. PCM smooths cycling of A/C compressor clutch by adding fuel the instant A/C compressor clutch is applied.

TROUBLE SHOOTING

NOTE: This article contains testing that is part of General Motors Computerized Engine Controls. Only testing procedures required to test A/C compressor clutch control circuit is included. Other diagnostic information may be referenced while performing A/C compressor clutch control diagnosis. For complete information on General Motors Computerized Engine Control systems, see **TESTS W/CODES** article in the **ENGINE PERFORMANCE** section.

RELAY LOCATION

A/C COMPRESSOR CLUTCH RELAY LOCATION

Application	Location
S/T Series	In Engine Compartment, On Bracket At Center Of Firewall

SCAN TOOL

A variety of information is transmitted through Data Link Connector (DLC). This data is transmitted at a high frequency which requires a Tech 1 scan tool, appropriate cartridge kit and vehicle interface module kit, or other scan tool for interpretation. Several scan tools are available for diagnostic work. Scan tools other than Tech 1 scan tool will function and provide information for diagnostic work.

WARNING: Vehicles may be equipped with a PCM using an Electronically Erasable Programmable Read Only Memory (EEPROM). When replacing PCM, the new PCM must be programmed.

1997 Chevrolet S10 Pickup

A/C COMPRESSOR CLUTCH CONTROLS 1997 A/C GENERAL SERVICING General Motors Corp. - A/C Compressor Clutch Controls

NOTE: To help save diagnostic time, **ALWAYS** check for blown fuses or fusible links before proceeding with any testing. If fuses are blown, locate and repair short circuit before replacing fuses. Ensure all related relay and wire harness connections are clean and tight. Repair as necessary.

A/C CLUTCH CIRCUIT DIAGNOSIS (2.2L VIN 4 - S10 & SONOMA ONLY)

Description

PCM receives an A/C request signal from Instrument Panel Cluster (IPC) over serial data line. When A/C is requested, PCM provides a ground path to A/C clutch relay control circuit. When relay circuit is grounded, A/C compressor clutch relay is energized. After A/C request has been selected, PCM will delay grounding A/C compressor relay control circuit for .3 second. This allows PCM to adjust engine idle RPM for additional load.

PCM will temporarily de-energize A/C compressor clutch relay for a hot engine restart, wide open throttle, engine speed greater than 6000 RPM, or Idle Air Control (IAC) valve reset. A/C compressor (DTC) P0530 is set, or there is no A/C request signal due to an open A/C select switch circuit.

Compressor Clutch Control Circuit Diagnosis

1. If On-Board Diagnostic (OBD) System Check has not been performed, see the TESTS W/CODES article in the ENGINE PERFORMANCE section and go to OBD SYSTEM CHECK. If OBD SYSTEM CHECK has been performed, go to next step.
2. Install scan tool. Check if DTC P0530 is set. If DTC P0530 is set, see the TESTS W/CODES article in the ENGINE PERFORMANCE section. If DTC P0530 is not set, go to next step.
3. Turn ignition on, engine off. Check if A/C compressor clutch is engaged. If A/C compressor clutch is engaged, go to next step. If A/C compressor clutch is not engaged, go to step 5).
4. Disconnect A/C relay. If A/C compressor clutch disengages, go to step 6). If A/C compressor clutch does not disengage, go to step 7).
5. Start engine and allow it to reach normal operating temperature. Cycle A/C selector switch on, then off. If A/C compressor clutch cycles on, then off, go to step 8). If A/C compressor clutch does not cycle on, then off, go to step 9).
6. Using a test light connected to battery voltage, probe A/C relay control circuit (Dark Green/White wire). If test light comes on, go to step 10). If test light does not come on, go to step 11).
7. Disconnect A/C compressor clutch harness connector. If A/C compressor clutch disengages, go to step 12). If A/C compressor clutch does not disengage, go to step 13).
8. Turn ignition on, engine off. Install A/C manifold gauge set. Observe A/C high-side pressure readings on gauge set and scan tool. If high-side pressures are within 20 psi (1.4 kg/cm²) of each other, go to step 36). If high-side pressures are not as specified, go to step 14).
9. Turn A/C on, then off. If scan tool indicates that A/C was requested, then not requested, go to step 15). If operation is not as specified, go to step 16).
10. Check A/C compressor clutch relay control circuit (Dark Green/White wire) for a short to ground. Repair as necessary. Go to step 36). If no problem is found, go to step 22).
11. Replace A/C compressor clutch relay. Go to step 36).

1997 Chevrolet S10 Pickup

A/C COMPRESSOR CLUTCH CONTROLS 1997 A/C GENERAL SERVICING General Motors Corp. - A/C Compressor Clutch Controls

12. Repair short to power in A/C compressor clutch ignition feed circuit (Dark Green wire). Go to step 36).
13. Replace faulty A/C compressor clutch assembly. Go to step 36).
14. Turn ignition on, engine off. Disconnect A/C refrigerant pressure sensor harness connector. Using a voltmeter, measure voltage between battery positive and Black wire at A/C refrigerant pressure sensor harness connector. If reading is battery voltage, go to step 18). If reading is not as specified, go to step 19).
15. With ignition on, engine off, observe A/C HIGH-SIDE pressure reading on scan tool. If reading is 40-430 psi (2.8-30.2 kg/cm²), go to step 20). If reading is not as specified, go to step 21).
16. Turn ignition off. Disconnect PCM harness connectors. Turn ignition on. Using a test light connected to ground, probe A/C selector switch input circuit (Light Green wire) at PCM harness connector. Cycle A/C selector switch on, then off. If test light toggles on, then off, go to next step. If operation is not as specified, go to step 23).
17. Check Light Green wire for a poor connection at PCM. Repair as necessary. Go to step 36). If no problem is found, go to step 22).
18. Replace A/C refrigerant pressure sensor. Go to step 36).
19. Repair open or poor connection in A/C refrigerant pressure sensor ground circuit (Black wire). Go to step 36).
20. Disconnect A/C relay. Using a test light connected to ground, probe A/C relay ignition feed circuits (Orange and Pink wires). If test light comes on for both circuits, go to step 24). If test light does not come on for both circuits, go to step 25).
21. Install A/C manifold gauge set. With ignition on, engine off, observe A/C high-side pressure readings on gauge set and scan tool. If high-side pressures are within 20 psi (1.4 kg/cm²) of each other, see the A/C-HEATER SYSTEM - MANUAL article. If high-side pressures are not as specified, go to step 18).
22. Replace PCM. Go to step 36).
23. Repair A/C request signal circuit (Light Green wire) from A/C selector switch. Go to step 36).
24. Connect a fused jumper wire between A/C relay harness connector cavities No. 87 (Orange wire) and No. 30 (Dark Green wire). If A/C compressor clutch engages, go to step 26). If A/C compressor clutch does not engage, leave jumper wire installed and go to step 27).
25. If test light did not come on at Orange wire, check for a short to ground in A/C compressor clutch ignition feed circuit (Dark Green wire), or for a faulty A/C compressor clutch diode. Repair as necessary. Go to step 36). If no problem is found, go to step 28).
26. Remove jumper wire. Start engine and let idle. Using a test light connected to battery positive, probe A/C relay harness connector cavity No. 85 (Dark Green/White wire). Using scan tool, command A/C relay on. If test light comes on, go to step 11). If test light does not come on, go to step 29).
27. Disconnect A/C compressor clutch harness connector. Using a test light connected to ground, probe Dark Green wire at A/C compressor clutch harness connector. If test light comes on, go to step 30). If test light does not come on, go to step 31).
28. Repair open in Orange wire or Pink wire to A/C relay. Go to step 36).
29. Using a test light connected to ground, probe A/C relay harness connector cavity No. 85 (Dark Green/White wire). If test light comes on, go to step 32). If test light does not come on, go to step 33).
30. Using a test light connected to battery positive, probe A/C compressor clutch ground circuit (Black wire) at A/C compressor clutch harness connector. If test light comes on, go to step 34). If test light does not

1997 Chevrolet S10 Pickup

A/C COMPRESSOR CLUTCH CONTROLS 1997 A/C GENERAL SERVICING General Motors Corp. - A/C Compressor Clutch Controls

come on, go to step 35).

31. Repair open in A/C compressor clutch ignition feed circuit (Dark Green wire). Go to step 36).
32. Check A/C compressor clutch relay control circuit (Dark Green/White wire) for a short to power. Repair as necessary. Go to step 36). If no problem is found, go to step 17).
33. Check A/C compressor clutch relay control circuit (Dark Green/White wire) for an open or poor connection. Repair as necessary. Go to step 36). If no problem is found, go to step 17).
34. Replace A/C compressor clutch coil. Go to step 36).
35. Repair open or poor connection in A/C compressor clutch ground circuit (Black wire). Go to next step.
36. Start engine and let idle. Cycle A/C selector switch on, then off. If A/C compressor clutch cycles on, then off, system is okay at this time. See DIAGNOSTIC AIDS. If operation is not as specified, go to step 2).

Diagnostic Aids

If DTC P0530 is set, do not perform this diagnostic procedure. Diagnose appropriate DTC before proceeding. See the TESTS W/CODES article in the ENGINE PERFORMANCE section.

A/C refrigerant pressure less than 43 psi (3.0 kg/cm²), or greater than 428 psi (30.1 kg/cm²) will cause PCM to disable A/C compressor clutch. With engine running and A/C on, use scan tool to monitor A/C high-side system pressure for 2 minutes. If pressure goes out of range, see the A/C-HEATER SYSTEM TROUBLE SHOOTING - MANUAL article.

A/C CLUTCH CIRCUIT DIAGNOSIS (4.3L VIN W & X - ALL MODELS)

Description

Vehicle Control Module (VCM) controls A/C clutch to improve idle quality and performance by delaying clutch engagement until idle speed is increased, releasing clutch when idle speed is too low, and smooths cycling of compressor by providing additional fuel the instant clutch is applied.

Turning on A/C supplies battery voltage through pressure switches to VCM. When VCM receives voltage on A/C request signal, A/C enable relay circuit is grounded. As a result, A/C compressor clutch engages.

Compressor Clutch Control Circuit Diagnosis

1. Before performing diagnosis, ensure A/C system is adequately charged. If system is not adequately charged, evacuate and recharge system. If system is adequately charged, go to next step.
2. Start engine and allow it to reach normal operating temperature. Turn A/C on, then off. If A/C clutch engages, then disengages within 20 seconds, go to the A/C-HEATER SYSTEM TROUBLE SHOOTING - MANUAL article for A/C system diagnosis. If operation is not as specified, go to step 3).
3. Connect scan tool. Turn A/C on. Monitor A/C REQUEST data. If display reads YES, go to next step. If display does not read YES, go to step 8).
4. Disconnect A/C compressor clutch harness connector. Connect a test light between A/C clutch signal circuit (Dark Green wire) and ground circuit (Black wire) of A/C compressor clutch harness connector. If test light comes on, go to next step. If test light does not come on, go to step 12).
5. Check for a faulty A/C compressor clutch harness connector. Repair as necessary. Go to next step. If no

1997 Chevrolet S10 Pickup

A/C COMPRESSOR CLUTCH CONTROLS 1997 A/C GENERAL SERVICING General Motors Corp. - A/C Compressor Clutch Controls

problem is found, go to step 7).

6. Repair A/C compressor clutch harness connector. Go to step 27).
7. Replace A/C compressor clutch. Go to step 27).
8. Turn ignition off. Disconnect VCM connector C3. Turn ignition on. Using a test light connected to ground, probe A/C request signal circuit (Dark Green/White wire) at VCM harness connector C3. If test light comes on, go to next step. If test light does not come on, go to step 11).
9. Check for poor connection at VCM harness connector C3. If a problem is found, go to next step. If no problem is found, go to step 26).
10. Repair VCM harness connector C3. Go to step 27).
11. Repair open or short to ground in Dark Green/White wire to A/C pressure switch and/or A/C control switch. Go to step 27).
12. Using a test light connected to ground, probe A/C compressor clutch signal circuit (Dark Green wire) at A/C compressor clutch harness connector. If test light comes on, go to next step. If test light does not come on, go to step 14).
13. Repair open in A/C compressor clutch ground circuit (Black wire). Go to step 27).
14. Install scan tool. Turn ignition on, engine off. Using scan tool, command A/C relay on. If A/C relay clicks, go to step 23). If A/C relay does not click, go to next step.
15. Disconnect A/C relay. Using a test light connected to ground, probe A/C relay harness connector cavity No. 85 (Pink wire). If test light comes on, go to step 17). If test light does not come on, go to next step.
16. Repair open or short to ground in A/C relay ignition feed circuit (Pink wire). Go to step 27).
17. Connect a test light between A/C relay harness connector cavities No. 85 (Pink wire) and No. 86 (Dark Green/White wire). Using scan tool, command A/C relay on. If test light comes on, go to next step. If test light does not come on, go to step 19).
18. Replace A/C relay. Go to step 27).
19. Check for a faulty connection at VCM harness connector C3. If a problem is found, go to next step. If no problem is found, go to step 21).
20. Repair faulty connection at VCM connector C3. Go to step 27).
21. Check for an open Dark Green/White wire between A/C relay harness connector cavity No. 86 and VCM harness connector C3, terminal No. 9. If a problem is found, go to next step. If no problem is found, go to step 26).
22. Repair open in Dark Green/White wire between A/C relay harness connector cavity No. 86 and VCM connector C3, terminal No. 9. Go to step 27).
23. Remove A/C relay. Using a fused jumper wire, jumper A/C relay harness connector cavities No. 30 (Orange wire) and No. 87 (Dark Green wire) together. If A/C compressor clutch engages, go to next step. If A/C compressor clutch does not engage, go to step 25).
24. Replace A/C relay. Go to step 27).
25. Repair open or short to ground in A/C compressor clutch control circuit (Dark Green wire). Go to step 27).
26. Replace VCM. Go to next step.
27. Using scan tool, select DTC CLEAR INFO. Start engine and allow it to reach normal operating temperature. Select DTC SPECIFIC, then enter DTC number that was set. Operate vehicle within conditions that may have set this DTC. If DTC does not reset, go to next step. If DTC resets, go to step

1997 Chevrolet S10 Pickup

A/C COMPRESSOR CLUTCH CONTROLS 1997 A/C GENERAL SERVICING General Motors Corp. - A/C Compressor Clutch Controls

2).

28. Using scan tool, select CAPTURE INFO, REVIEW INFO. If any DTCs are displayed that have not been diagnosed, perform diagnosis for applicable DTC. See the TESTS W/CODES article in the ENGINE PERFORMANCE section. If no DTCs are displayed, testing is complete.